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www.deltacouncil.ca.gov

Yolo County: Rural Levee Evaluations
(Log number Nov11 - 7)

Staff Recommendation: No action at this time.

DWR has developed a program schedule that balances the prioritization of population centers and the sequencing of rural levee evaluations in a cost effective manner.

Background

The applicant is requesting the Delta Stewardship Council (Council) ensure adequate funding and other support for expeditious completion of the DWR study of rural levees in the Delta and dissemination of the information.

The Levee Evaluation Program is an established DWR program to survey and evaluate the entire 1,600 miles of project levees in the Central Valley and the Delta. The highest priority areas are the levees that protect large population centers such as Sacramento, Stockton/Lathrop area and the Yuba City/Marysville area. The Non-Urban Levee Evaluation Program, part of the overall Levee Evaluation Program, focuses on levees that protect smaller population centers, less than 5,000 people, or levees that protect areas with a smaller population density. The entire program is anticipated to take several more years to complete.

The levees protecting Clarksburg and the levees protecting Knight's Landing are scheduled to be evaluated per the program schedule developed by DWR. The Program currently has sufficient funds and is funded through the sale of Proposition 84 and Proposition 1E bonds.

List of Attachments

Attachment 1 – Levee Evaluation Fact Sheet
Attachment 2 – Early Action Summary Form
Attachment 3 – Application for Consideration of a Plan or Project

Contact

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DEPARTMENT OF WATER RESOURCES

LEVEE EVALUATION PROGRAM

Levee Analysis Methods

Updated Winter 2008

Reflecting Governor Arnold Schwarzenegger's long-term commitment to improving flood safety to prevent possible catastrophic flooding and loss of life, the State of California's Department of Water Resources (DWR) is undertaking unprecedented efforts to evaluate and upgrade aging and deteriorating levees in the Sacramento and San Joaquin River Valleys and Delta.

Of highest priority, DWR is fully evaluating more than 300 miles of urban project levees in these areas, with plans to later survey the entire 1,600 miles of project levees in the Central Valley. Funding for the levee evaluation efforts is provided through two large flood control bonds approved by California voters in November 2006, Propositions 84 and 1E.

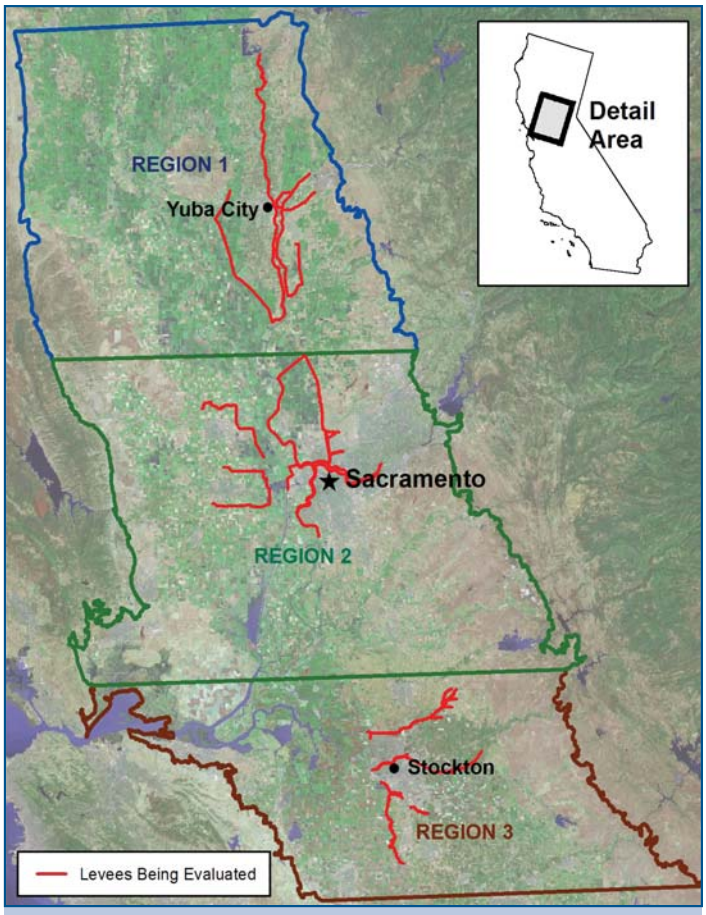
As an essential first step in providing improved flood protection for communities in the Central Valley, DWR is conducting geotechnical exploration, testing, and analysis of state and federal levees that protect the highly populated urban areas of greater Sacramento, Stockton/Lathrop, and Marysville/Yuba City. (This program is being implemented simultaneously with various urgent levee repairs.)

To expedite flood control efforts aimed at protecting these communities, levee evaluations are being conducted in a fast-track manner over a two- to three-year period. During this time, technical specialists are reviewing existing levee historical data; conducting field explorations (including drilling and geophysical methods, along with associated laboratory testing); performing engineering, stability and seepage analyses; and preparing preliminary design and construction estimates for repairing and upgrading the levees, where needed.

As part of its mission, DWR is also responding to requests to assist various local agencies by surveying other non-project-related levees during the evaluation process. DWR is committed to assisting local agencies in determining the best way to implement and fund needed repairs to their levees.

DWR has dedicated a website for those interested in the levee repair and evaluation efforts. To view repair and survey locations and other levee information, please visit:

www.water.ca.gov/levees



Throughout the Central Valley, levees provide essential protection for communities and farmland, preventing possible catastrophic flooding and loss of life. DWR is currently evaluating more than 300 miles of project levees protecting the urban areas of Marysville/Yuba City, Sacramento, and Stockton/Lathrop.

Levee Analyses

Levee analyses look at both the past and future (projected) performance of flood control levees as it relates to seepage, stability, erosion, settlement, and seismic factors. To get a detailed picture of the flood control system's current condition, experts study a wide range of critical levee properties, including:

- Geomorphology
- Levee topography
- Subsurface conditions
- Historical events
- Man-made conditions
- Erosion conditions

The results of the levee analyses will be reviewed by DWR, the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers (USACE), and local agencies.

Rev. 02.26.08

Evaluation Methods

In addition to the basic geotechnical evaluation program of drilling and boring to collect levee soil samples, other proven methods and innovative technologies are being used to develop a comprehensive understanding of the levees' existing subsurface conditions. These methods include regional geomorphologic assessments, detailed mapping of geomorphic features and surficial geologic deposits, Light Detection and Ranging (LiDAR) topographic surveys, geophysical electromagnetic (EM) surveys, and underwater bathymetric surveys. Data collected from these and other methods is used to cumulatively assess the levees' structural integrity and identify which areas are most in need of critical improvements or repairs.

Geotechnical Evaluations (Drilling)

Much of the evaluation of the levees and their foundations is done by relatively straightforward methods (e.g., drilling and boring) to collect soil samples, which are then analyzed to assess subsurface conditions. These ongoing subsurface explorations are typically conducted at 1,000-foot intervals along the levees, with additional explorations done on the landside of the levees. Looking closely at subsurface soil conditions—such as moisture, density, and soil grain size distribution—helps identify potential problems or weaknesses in the flood control structures.

Geomorphologic Assessments

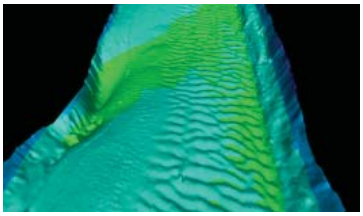
By studying the evolution of landforms and the processes that alter them, scientists can better assess levee stability and understand the materials beneath the levees. For the levee evaluation program, experts are preparing a comprehensive surficial geologic map of project areas, based on field reconnaissance observations and review of vintage aerial photos and topographic maps, geologic maps, and satellite imagery. Results of this effort will lead to a better understanding of the geologic materials directly beneath existing levees and of the geomorphic processes (e.g., erosion, deposition) responsible for those materials.

Light Detection and Ranging (LiDAR) Topographic Surveys

Light Detection and Ranging (LiDAR) technology deployed in low-flying helicopters was used to electronically gather data about the topography and configuration of the flood control levees. In spring 2007, helicopter flights equipped with LiDAR performed aerial topographic surveys over approximately 500 miles of levees stretching from Oroville to Lathrop. Airborne LiDAR produces accurate elevation models for terrain, which helps in evaluating the geotechnical and erosion characteristics of the surveyed levees.

Electromagnetic (EM) Surveys

Another way to evaluate levee subsurface conditions is by conducting geophysical electromagnetic (EM) surveys. Like LiDAR, this technology is deployed during helicopter flights over the levees. An EM survey sensor which resembles an airborne torpedo is suspended from the helicopter about 100 feet above the levees. The EM technology senses variations in the ground's electrical conductivity to depths of more than 100 feet underground. The goal is to map important changes in soil types and ground conditions, identifying zones where permeable soils are present or excessive water penetration is taking place. These surveys were conducted in late summer 2007 along more than 200 miles of levees on the Feather River, Bear River, American River, Sutter Bypass, Yolo Bypass, Sacramento River, Stanislaus River, San Joaquin River, and tributaries.



Bathymetric Surveys

Underwater bathymetric surveys are explorations conducted by boats equipped with special multibeam sonar. These surveys produce detailed topographic data of the riverbed and riverbanks that essentially form the base of the levee systems. The collected data provide an image of the levees' underwater structure that cannot be obtained by conventional land topographic methods. The data are especially important in revealing underwater erosion of the riverbanks. Bathymetric surveys were conducted from Dec. 2007 to Jan. 2008 along parts of the Sacramento, American, San Joaquin, and Calaveras Rivers. The survey's ultimate purpose is to supplement the above-water topographic data collected during the LiDAR surveys. Together, this information will be used to assist in the geotechnical evaluation of the levees. ■

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